

LM78XX / LM78XXA

3-Terminal 1 A Positive Voltage Regulator

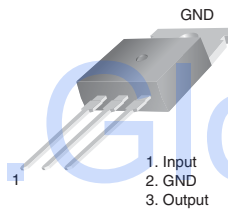
Features

- Output Current up to 1 A
- Output Voltages: 5, 6, 8, 9, 10, 12, 15, 18, 24 V
- Thermal Overload Protection
- Short-Circuit Protection
- Output Transistor Safe Operating Area Protection

Description

The LM78XX series of three-terminal positive regulators is available in the TO-220 package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut-down, and safe operating area protection. If adequate heat sinking is provided, they can deliver over 1 A output current. Although designed primarily as fixed-voltage regulators, these devices can be used with external components for adjustable voltages and currents.

TO-220 (Single Gauge)



Datasheet Global

LM78XX / LM78XXA — 3-Terminal 1 A Positive Voltage Regulator

Ordering Information⁽¹⁾

Product Number	Output Voltage Tolerance	Package	Operating Temperature	Packing Method
LM7805CT	±4%	TO-220 (Single Gauge)	-40°C to +125°C	Rail
LM7806CT				
LM7808CT				
LM7809CT				
LM7810CT				
LM7812CT				
LM7815CT				
LM7818CT				
LM7824CT				
LM7805ACT	±2%	TO-220 (Single Gauge)	0°C to +125°C	Rail
LM7809ACT				
LM7810ACT				
LM7812ACT				
LM7815ACT				

Note:

1. Above output voltage tolerance is available at 25°C.

Block Diagram

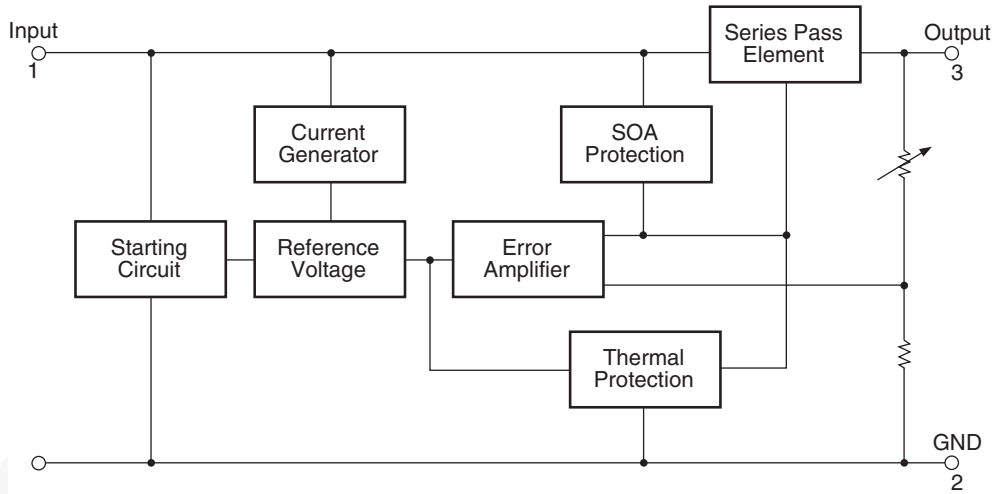


Figure 1. Block Diagram

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter		Value	Unit
V_I	Input Voltage	$V_O = 5\text{ V to }18\text{ V}$	35	V
		$V_O = 24\text{ V}$	40	
$R_{\theta JC}$	Thermal Resistance, Junction-Case (TO-220)		5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-Air (TO-220)		65	$^\circ\text{C/W}$
T_{OPR}	Operating Temperature Range	LM78xx	-40 to +125	$^\circ\text{C}$
		LM78xxA	0 to +125	
T_{STG}	Storage Temperature Range		- 65 to +150	$^\circ\text{C}$

Electrical Characteristics (LM7805)

Refer to the test circuit, $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{ mA}$, $V_I = 10\text{ V}$, $C_I = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	4.80	5.00	5.20	V	
		$I_O = 5\text{ mA to }1\text{ A}$, $P_O \leq 15\text{ W}$, $V_I = 7\text{ V to }20\text{ V}$	4.75	5.00	5.25		
Regline	Line Regulation ⁽²⁾	$T_J = +25^{\circ}\text{C}$	$V_I = 7\text{ V to }25\text{ V}$		4.0	100.0	mV
			$V_I = 8\text{ V to }12\text{ V}$		1.6	50.0	
Regload	Load Regulation ⁽²⁾	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{ mA to }1.5\text{ A}$		9.0	100.0	mV
			$I_O = 250\text{ mA to }750\text{ mA}$		4.0	50.0	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.0	8.0	mA	
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$		0.03	0.50	mA	
		$V_I = 7\text{ V to }25\text{ V}$		0.30	1.30		
$\Delta V_O/\Delta T$	Output Voltage Drift ⁽³⁾	$I_O = 5\text{ mA}$		-0.8		mV/ $^{\circ}\text{C}$	
V_N	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$, $T_A = +25^{\circ}\text{C}$		42.0		$\mu\text{V}/V_O$	
RR	Ripple Rejection ⁽³⁾	$f = 120\text{ Hz}$, $V_I = 8\text{ V to }18\text{ V}$	62.0	73.0		dB	
V_{DROP}	Dropout Voltage	$T_J = +25^{\circ}\text{C}$, $I_O = 1\text{ A}$		2.0		V	
R_O	Output Resistance ⁽³⁾	$f = 1\text{ kHz}$		15.0		m Ω	
I_{SC}	Short-Circuit Current	$T_J = +25^{\circ}\text{C}$, $V_I = 35\text{ V}$		230		mA	
I_{PK}	Peak Current ⁽³⁾	$T_J = +25^{\circ}\text{C}$		2.2		A	

Notes:

- Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
- These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7806)

Refer to the test circuit, $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{ mA}$, $V_I = 11\text{ V}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	5.75	6.00	6.25	V	
		$I_O = 5\text{ mA to }1\text{ A}$, $P_O \leq 15\text{ W}$, $V_I = 8.0\text{ V to }21\text{ V}$	5.70	6.00	6.30		
Regline	Line Regulation ⁽⁴⁾	$T_J = +25^{\circ}\text{C}$	$V_I = 8\text{ V to }25\text{ V}$		5.0	120	mV
			$V_I = 9\text{ V to }13\text{ V}$		1.5	60.0	
Regload	Load Regulation ⁽⁴⁾	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{ mA to }1.5\text{ A}$		9.0	120.0	mV
			$I_O = 250\text{ mA to }750\text{ mA}$		3.0	60.0	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.0	8.0	mA	
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA	
		$V_I = 8\text{ V to }25\text{ V}$			1.3		
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽⁵⁾	$I_O = 5\text{ mA}$		-0.8		mV/ $^{\circ}\text{C}$	
V_N	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$, $T_A = +25^{\circ}\text{C}$		45.0		$\mu\text{V}/V_O$	
RR	Ripple Rejection ⁽⁵⁾	$f = 120\text{ Hz}$, $V_I = 8\text{ V to }18\text{ V}$	62.0	73.0		dB	
V_{DROP}	Dropout Voltage	$T_J = +25^{\circ}\text{C}$, $I_O = 1\text{ A}$		2.0		V	
R_O	Output Resistance ⁽⁵⁾	$f = 1\text{ kHz}$		19.0		m Ω	
I_{SC}	Short-Circuit Current	$T_J = +25^{\circ}\text{C}$, $V_I = 35\text{ V}$		250		mA	
I_{PK}	Peak Current ⁽⁵⁾	$T_J = +25^{\circ}\text{C}$		2.2		A	

Notes:

- Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
- These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7808)

Refer to the test circuit, $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{ mA}$, $V_I = 14\text{ V}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	7.7	8.0	8.3	V	
		$I_O = 5\text{ mA to }1\text{ A}$, $P_O \leq 15\text{ W}$, $V_I = 10.5\text{ V to }23\text{ V}$	7.6	8.0	8.4		
Regline	Line Regulation ⁽⁶⁾	$T_J = +25^{\circ}\text{C}$	$V_I = 10.5\text{ V to }25\text{ V}$		5.0	160.0	mV
			$V_I = 11.5\text{ V to }17\text{ V}$		2.0	80.0	
Regload	Load Regulation ⁽⁶⁾	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{ mA to }1.5\text{ A}$		10.0	160.0	mV
			$I_O = 250\text{ mA to }750\text{ mA}$		5.0	80.0	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.0	8.0	mA	
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$		0.05	0.50	mA	
		$V_I = 10.5\text{ V to }25\text{ V}$		0.5	1.0		
$\Delta V_O/\Delta T$	Output Voltage Drift ⁽⁷⁾	$I_O = 5\text{ mA}$		-0.8		mV/ $^{\circ}\text{C}$	
V_N	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$, $T_A = +25^{\circ}\text{C}$		52.0		$\mu\text{V}/V_O$	
RR	Ripple Rejection ⁽⁷⁾	$f = 120\text{ Hz}$, $V_I = 11.5\text{ V to }21.5\text{ V}$	56.0	73.0		dB	
V_{DROP}	Dropout Voltage	$I_O = 1\text{ A}$, $T_J = +25^{\circ}\text{C}$		2.0		V	
R_O	Output Resistance ⁽⁷⁾	$f = 1\text{ kHz}$		17.0		m Ω	
I_{SC}	Short-Circuit Current	$V_I = 35\text{ V}$, $T_J = +25^{\circ}\text{C}$		230		mA	
I_{PK}	Peak Current ⁽⁷⁾	$T_J = +25^{\circ}\text{C}$		2.2		A	

Notes:

6. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
7. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7809)

Refer to the test circuit, $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{ mA}$, $V_I = 15\text{ V}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	8.65	9.00	9.35	V	
		$I_O = 5\text{ mA to }1\text{ A}$, $P_O \leq 15\text{ W}$, $V_I = 11.5\text{ V to }24\text{ V}$	8.60	9.00	9.40		
Regline	Line Regulation ⁽⁸⁾	$T_J = +25^{\circ}\text{C}$	$V_I = 11.5\text{ V to }25\text{ V}$		6.0	180.0	mV
			$V_I = 12\text{ V to }17\text{ V}$		2.0	90.0	
Regload	Load Regulation ⁽⁸⁾	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{ mA to }1.5\text{ A}$		12.0	180.0	mV
			$I_O = 250\text{ mA to }750\text{ mA}$		4.0	90.0	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.0	8.0	mA	
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$ $V_I = 11.5\text{ V to }26\text{ V}$			0.5	mA	
					1.3		
$\Delta V_O/\Delta T$	Output Voltage Drift ⁽⁹⁾	$I_O = 5\text{ mA}$		-1.0		mV/ $^{\circ}\text{C}$	
V_N	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$, $T_A = +25^{\circ}\text{C}$		58.0		$\mu\text{V}/V_O$	
RR	Ripple Rejection ⁽⁹⁾	$f = 120\text{ Hz}$, $V_I = 13\text{ V to }23\text{ V}$	56.0	71.0		dB	
V_{DROP}	Dropout Voltage	$I_O = 1\text{ A}$, $T_J = +25^{\circ}\text{C}$		2.0		V	
R_O	Output Resistance ⁽⁹⁾	$f = 1\text{ kHz}$		17.0		m Ω	
I_{SC}	Short-Circuit Current	$V_I = 35\text{ V}$, $T_J = +25^{\circ}\text{C}$		250		mA	
I_{PK}	Peak Current ⁽⁹⁾	$T_J = +25^{\circ}\text{C}$		2.2		A	

Notes:

8. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
9. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7810)

Refer to the test circuit, $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{ mA}$, $V_I = 16\text{ V}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	9.6	10.0	10.4	V	
		$I_O = 5\text{ mA to }1\text{ A}$, $P_O \leq 15\text{ W}$, $V_I = 12.5\text{ V to }25\text{ V}$	9.5	10.0	10.5		
Regline	Line Regulation ⁽¹⁰⁾	$T_J = +25^{\circ}\text{C}$	$V_I = 12.5\text{ V to }25\text{ V}$		10	200	mV
			$V_I = 13\text{ V to }25\text{ V}$		3	100	
Regload	Load Regulation ⁽¹⁰⁾	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{ mA to }1.5\text{ A}$		12	200	mV
			$I_O = 250\text{ mA to }750\text{ mA}$		4	400	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.1	8.0	mA	
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA	
		$V_I = 12.5\text{ V to }29\text{ V}$			1.0		
$\Delta V_O/\Delta T$	Output Voltage Drift ⁽¹¹⁾	$I_O = 5\text{ mA}$		-1.0		mV/ $^{\circ}\text{C}$	
V_N	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$, $T_A = +25^{\circ}\text{C}$		58.0		$\mu\text{V}/V_O$	
RR	Ripple Rejection ⁽¹¹⁾	$f = 120\text{ Hz}$, $V_I = 13\text{ V to }23\text{ V}$	56.0	71.0		dB	
V_{DROP}	Dropout Voltage	$I_O = 1\text{ A}$, $T_J = +25^{\circ}\text{C}$		2.0		V	
R_O	Output Resistance ⁽¹¹⁾	$f = 1\text{ kHz}$		17.0		m Ω	
I_{SC}	Short-Circuit Current	$V_I = 35\text{ V}$, $T_J = +25^{\circ}\text{C}$		250		mA	
I_{PK}	Peak Current ⁽¹¹⁾	$T_J = +25^{\circ}\text{C}$		2.2		A	

Notes:

10. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

11. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7812)

Refer to the test circuit, $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{ mA}$, $V_I = 19\text{ V}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	11.5	12.0	12.5	V	
		$I_O = 5\text{ mA to }1\text{ A}$, $P_O \leq 15\text{ W}$, $V_I = 14.5\text{ V to }27\text{ V}$	11.4	12.0	12.6		
Regline	Line Regulation ⁽¹²⁾	$T_J = +25^{\circ}\text{C}$	$V_I = 14.5\text{ V to }30\text{ V}$		10	240	mV
			$V_I = 16\text{ V to }22\text{ V}$		3	120	
Regload	Load Regulation ⁽¹²⁾	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{ mA to }1.5\text{ A}$		11	240	mV
			$I_O = 250\text{ mA to }750\text{ mA}$		5	120	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.1	8.0	mA	
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$		0.1	0.5	mA	
		$V_I = 14.5\text{ V to }30\text{ V}$		0.5	1.0		
$\Delta V_O/\Delta T$	Output Voltage Drift ⁽¹³⁾	$I_O = 5\text{ mA}$		-1.0		mV/ $^{\circ}\text{C}$	
V_N	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$, $T_A = +25^{\circ}\text{C}$		76.0		$\mu\text{V}/V_O$	
RR	Ripple Rejection ⁽¹³⁾	$f = 120\text{ Hz}$, $V_I = 15\text{ V to }25\text{ V}$	55.0	71.0		dB	
V_{DROP}	Dropout Voltage	$I_O = 1\text{ A}$, $T_J = +25^{\circ}\text{C}$		2.0		V	
R_O	Output Resistance ⁽¹³⁾	$f = 1\text{ kHz}$		18.0		m Ω	
I_{SC}	Short-Circuit Current	$V_I = 35\text{ V}$, $T_J = +25^{\circ}\text{C}$		230		mA	
I_{PK}	Peak Current ⁽¹³⁾	$T_J = +25^{\circ}\text{C}$		2.2		A	

Notes:

12. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
13. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7815)

Refer to the test circuit, $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{ mA}$, $V_I = 23\text{ V}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	14.40	15.00	15.60	V	
		$I_O = 5\text{ mA to }1\text{ A}$, $P_O \leq 15\text{ W}$, $V_I = 17.5\text{ V to }30\text{ V}$	14.25	15.00	15.75		
Regline	Line Regulation ⁽¹⁴⁾	$T_J = +25^{\circ}\text{C}$	$V_I = 17.5\text{ V to }30\text{ V}$		11	300	mV
			$V_I = 20\text{ V to }26\text{ V}$		3	150	
Regload	Load Regulation ⁽¹⁴⁾	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{ mA to }1.5\text{ A}$		12	300	mV
			$I_O = 250\text{ mA to }750\text{ mA}$		4	150	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.2	8.0	mA	
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA	
		$V_I = 17.5\text{ V to }30\text{ V}$			1.0		
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽¹⁵⁾	$I_O = 5\text{ mA}$		-1.0		mV/ $^{\circ}\text{C}$	
V_N	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$, $T_A = +25^{\circ}\text{C}$		90.0		$\mu\text{V}/V_O$	
RR	Ripple Rejection ⁽¹⁵⁾	$f = 120\text{ Hz}$, $V_I = 18.5\text{ V to }28.5\text{ V}$	54.0	70.0		dB	
V_{DROP}	Dropout Voltage	$I_O = 1\text{ A}$, $T_J = +25^{\circ}\text{C}$		2.0		V	
R_O	Output Resistance ⁽¹⁵⁾	$f = 1\text{ kHz}$		19.0		m Ω	
I_{SC}	Short-Circuit Current	$V_I = 35\text{ V}$, $T_J = +25^{\circ}\text{C}$		250		mA	
I_{PK}	Peak Current ⁽¹⁵⁾	$T_J = +25^{\circ}\text{C}$		2.2		A	

Notes:

14. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
15. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7818)

Refer to the test circuit, $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{ mA}$, $V_I = 27\text{ V}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	17.3	18.0	18.7	V	
		$I_O = 5\text{ mA to }1\text{ A}$, $P_O \leq 15\text{ W}$, $V_I = 21\text{ V to }33\text{ V}$	17.1	18.0	18.9		
Regline	Line Regulation ⁽¹⁶⁾	$T_J = +25^{\circ}\text{C}$	$V_I = 21\text{ V to }33\text{ V}$		15	360	mV
			$V_I = 24\text{ V to }30\text{ V}$		5	180	
Regload	Load Regulation ⁽¹⁶⁾	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{ mA to }1.5\text{ A}$		15	360	mV
			$I_O = 250\text{ mA to }750\text{ mA}$		5	180	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.2	8.0	mA	
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA	
		$V_I = 21\text{ V to }33\text{ V}$			1.0		
$\Delta V_O/\Delta T$	Output Voltage Drift ⁽¹⁷⁾	$I_O = 5\text{ mA}$		-1.0		mV/ $^{\circ}\text{C}$	
V_N	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$, $T_A = +25^{\circ}\text{C}$		110		$\mu\text{V}/V_O$	
RR	Ripple Rejection ⁽¹⁷⁾	$f = 120\text{ Hz}$, $V_I = 22\text{ V to }32\text{ V}$	53.0	69.0		dB	
V_{DROP}	Dropout Voltage	$I_O = 1\text{ A}$, $T_J = +25^{\circ}\text{C}$		2.0		V	
R_O	Output Resistance ⁽¹⁷⁾	$f = 1\text{ kHz}$		22.0		m Ω	
I_{SC}	Short-Circuit Current	$V_I = 35\text{ V}$, $T_J = +25^{\circ}\text{C}$		250		mA	
I_{PK}	Peak Current ⁽¹⁷⁾	$T_J = +25^{\circ}\text{C}$		2.2		A	

Notes:

16. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

17. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7824)

Refer to the test circuit, $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{ mA}$, $V_I = 33\text{ V}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	23.00	24.00	25.00	V	
		$I_O = 5\text{ mA to }1\text{ A}$, $P_O \leq 15\text{ W}$, $V_I = 27\text{ V to }38\text{ V}$	22.80	24.00	25.25		
Regline	Line Regulation ⁽¹⁸⁾	$T_J = +25^{\circ}\text{C}$	$V_I = 27\text{ V to }38\text{ V}$		17	480	mV
			$V_I = 30\text{ V to }36\text{ V}$		6	240	
Regload	Load Regulation ⁽¹⁸⁾	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{ mA to }1.5\text{ A}$		15	480	mV
			$I_O = 250\text{ mA to }750\text{ mA}$		5	240	
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.2	8.0	mA	
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$		0.1	0.5	mA	
		$V_I = 27\text{ V to }38\text{ V}$		0.5	1.0		
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽¹⁹⁾	$I_O = 5\text{ mA}$		-1.5		mV/ $^{\circ}\text{C}$	
V_N	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$, $T_A = +25^{\circ}\text{C}$		6.0		$\mu\text{V}/V_O$	
RR	Ripple Rejection ⁽¹⁹⁾	$f = 120\text{ Hz}$, $V_I = 28\text{ V to }38\text{ V}$	50.0	67.0		dB	
V_{DROP}	Dropout Voltage	$I_O = 1\text{ A}$, $T_J = +25^{\circ}\text{C}$		2.0		V	
R_O	Output Resistance ⁽¹⁹⁾	$f = 1\text{ kHz}$		28.0		m Ω	
I_{SC}	Short-Circuit Current	$V_I = 35\text{ V}$, $T_J = +25^{\circ}\text{C}$		230		mA	
I_{PK}	Peak Current ⁽¹⁹⁾	$T_J = +25^{\circ}\text{C}$		2.2		A	

Notes:

18. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

19. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7805A)

Refer to the test circuit, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 1\text{ A}$, $V_I = 10\text{ V}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	4.9	5.0	5.1	V	
		$I_O = 5\text{ mA to }1\text{ A}$, $P_O \leq 15\text{ W}$, $V_I = 7.5\text{ V to }20\text{ V}$	4.8	5.0	5.2		
Regline	Line Regulation ⁽²⁰⁾	$V_I = 7.5\text{ V to }25\text{ V}$, $I_O = 500\text{ mA}$		5.0	50.0	mV	
		$V_I = 8\text{ V to }12\text{ V}$		3.0	50.0		
		$T_J = +25^{\circ}\text{C}$	$V_I = 7.3\text{ V to }20\text{ V}$		5.0		50.0
			$V_I = 8\text{ V to }12\text{ V}$		1.5		25.0
Regload	Load Regulation ⁽²⁰⁾	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{ mA to }1.5\text{ A}$		9.0	100.0	mV	
		$I_O = 5\text{ mA to }1\text{ A}$		9.0	100.0		
		$I_O = 250\text{ mA to }750\text{ mA}$		4.0	50.0		
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.0	6.0	mA	
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA	
		$V_I = 8\text{ V to }25\text{ V}$, $I_O = 500\text{ mA}$			0.8		
		$V_I = 7.5\text{ V to }20\text{ V}$, $T_J = +25^{\circ}\text{C}$			0.8		
$\Delta V_O/\Delta T$	Output Voltage Drift ⁽²¹⁾	$I_O = 5\text{ mA}$		-0.8		mV/ $^{\circ}\text{C}$	
V_N	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$, $T_A = +25^{\circ}\text{C}$		10.0		$\mu\text{V}/V_O$	
RR	Ripple Rejection ⁽²¹⁾	$f = 120\text{ Hz}$, $V_O = 500\text{ mA}$, $V_I = 8\text{ V to }18\text{ V}$		68.0		dB	
V_{DROP}	Dropout Voltage	$I_O = 1\text{ A}$, $T_J = +25^{\circ}\text{C}$		2.0		V	
R_O	Output Resistance ⁽²¹⁾	$f = 1\text{ kHz}$		17.0		m Ω	
I_{SC}	Short-Circuit Current	$V_I = 35\text{ V}$, $T_J = +25^{\circ}\text{C}$		250		mA	
I_{PK}	Peak Current ⁽²¹⁾	$T_J = +25^{\circ}\text{C}$		2.2		A	

Notes:

20. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

21. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7809A)Refer to the test circuit, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 1\text{ A}$, $V_I = 15\text{ V}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	8.82	9.00	9.16	V	
		$I_O = 5\text{ mA to } 1\text{ A}$, $P_O \leq 15\text{ W}$, $V_I = 11.2\text{ V to } 24\text{ V}$	8.65	9.00	9.35		
Regline	Line Regulation ⁽²²⁾	$V_I = 11.7\text{ V to } 25\text{ V}$, $I_O = 500\text{ mA}$		6.0	90.0	mV	
		$V_I = 12.5\text{ V to } 19\text{ V}$		4.0	45.0		
		$T_J = +25^{\circ}\text{C}$	$V_I = 11.5\text{ V to } 24\text{ V}$		6.0		90.0
			$V_I = 12.5\text{ V to } 19\text{ V}$		2.0		45.0
Regload	Load Regulation ⁽²²⁾	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{ mA to } 1.5\text{ A}$		12.0	100.0	mV	
		$I_O = 5\text{ mA to } 1\text{ A}$		12.0	100.0		
		$I_O = 250\text{ mA to } 750\text{ mA}$		5.0	50.0		
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.0	6.0	mA	
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to } 1\text{ A}$			0.5	mA	
		$V_I = 12\text{ V to } 25\text{ V}$, $I_O = 500\text{ mA}$			0.8		
		$V_I = 11.7\text{ V to } 25\text{ V}$, $T_J = +25^{\circ}\text{C}$			0.8		
$\Delta V_O/\Delta T$	Output Voltage Drift ⁽²³⁾	$I_O = 5\text{ mA}$		-1.0		mV/ $^{\circ}\text{C}$	
V_N	Output Noise Voltage	$f = 10\text{ Hz to } 100\text{ kHz}$, $T_A = +25^{\circ}\text{C}$		10.0		$\mu\text{V}/V_O$	
RR	Ripple Rejection ⁽²³⁾	$f = 120\text{ Hz}$, $V_O = 500\text{ mA}$, $V_I = 12\text{ V to } 22\text{ V}$		62.0		dB	
V_{DROPP}	Dropout Voltage	$I_O = 1\text{ A}$, $T_J = +25^{\circ}\text{C}$		2.0		V	
R_O	Output Resistance ⁽²³⁾	$f = 1\text{ kHz}$		17.0		m Ω	
I_{SC}	Short-Circuit Current	$V_I = 35\text{ V}$, $T_J = +25^{\circ}\text{C}$		250		mA	
I_{PK}	Peak Current ⁽²³⁾	$T_J = +25^{\circ}\text{C}$		2.2		A	

Notes:

22. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

23. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7810A)

Refer to the test circuit, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 1\text{ A}$, $V_I = 16\text{ V}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	9.8	10.0	10.2	V	
		$I_O = 5\text{ mA to }1\text{ A}$, $P_O \leq 15\text{ W}$, $V_I = 12.8\text{ V to }25\text{ V}$	9.6	10.0	10.4		
Regline	Line Regulation ⁽²⁴⁾	$V_I = 12.8\text{ V to }26\text{ V}$, $I_O = 500\text{ mA}$		8.0	100.0	mV	
		$V_I = 13\text{ V to }20\text{ V}$		4.0	50.0		
		$T_J = +25^{\circ}\text{C}$	$V_I = 12.5\text{ V to }25\text{ V}$		8.0		100.0
			$V_I = 13\text{ V to }20\text{ V}$		3.0		50.0
Regload	Load Regulation ⁽²⁴⁾	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{ mA to }1.5\text{ A}$		12.0	100.0	mV	
		$I_O = 5\text{ mA to }1\text{ A}$		12.0	100.0		
		$I_O = 250\text{ mA to }750\text{ mA}$		5.0	50.0		
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.0	6.0	mA	
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA	
		$V_I = 12.8\text{ V to }25\text{ V}$, $I_O = 500\text{ mA}$			0.8		
		$V_I = 13\text{ V to }26\text{ V}$, $T_J = +25^{\circ}\text{C}$			0.5		
$\Delta V_O/\Delta T$	Output Voltage Drift ⁽²⁵⁾	$I_O = 5\text{ mA}$		-1.0		mV/ $^{\circ}\text{C}$	
V_N	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$, $T_A = +25^{\circ}\text{C}$		10.0		$\mu\text{V}/V_O$	
RR	Ripple Rejection ⁽²⁵⁾	$f = 120\text{ Hz}$, $V_O = 500\text{ mA}$, $V_I = 14\text{ V to }24\text{ V}$		62.0		dB	
V_{DROP}	Dropout Voltage	$I_O = 1\text{ A}$, $T_J = +25^{\circ}\text{C}$		2.0		V	
R_O	Output Resistance ⁽²⁵⁾	$f = 1\text{ kHz}$		17.0		m Ω	
I_{SC}	Short-Circuit Current	$V_I = 35\text{ V}$, $T_J = +25^{\circ}\text{C}$		250		mA	
I_{PK}	Peak Current ⁽²⁵⁾	$T_J = +25^{\circ}\text{C}$		2.2		A	

Notes:

24. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

25. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7812A)Refer to the test circuit, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 1\text{ A}$, $V_I = 19\text{ V}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	11.75	12.00	12.25	V	
		$I_O = 5\text{ mA to }1\text{ A}$, $P_O \leq 15\text{ W}$, $V_I = 14.8\text{ V to }27\text{ V}$	11.50	12.00	12.50		
Regline	Line Regulation ⁽²⁶⁾	$V_I = 14.8\text{ V to }30\text{ V}$, $I_O = 500\text{ mA}$		10.0	120.0	mV	
		$V_I = 16\text{ V to }22\text{ V}$		4.0	120.0		
		$T_J = +25^{\circ}\text{C}$	$V_I = 14.5\text{ V to }27\text{ V}$		10.0		120.0
			$V_I = 16\text{ V to }22\text{ V}$		3.0		60.0
Regload	Load Regulation ⁽²⁶⁾	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{ mA to }1.5\text{ A}$		12.0	100.0	mV	
		$I_O = 5\text{ mA to }1\text{ A}$		12.0	100.0		
		$I_O = 250\text{ mA to }750\text{ mA}$		5.0	50.0		
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.0	6.0	mA	
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA	
		$V_I = 14\text{ V to }27\text{ V}$, $I_O = 500\text{ mA}$			0.8		
		$V_I = 15\text{ V to }30\text{ V}$, $T_J = +25^{\circ}\text{C}$			0.8		
$\Delta V_O/\Delta T$	Output Voltage Drift ⁽²⁷⁾	$I_O = 5\text{ mA}$		-1.0		mV/ $^{\circ}\text{C}$	
V_N	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$, $T_A = +25^{\circ}\text{C}$		10.0		$\mu\text{V}/V_O$	
RR	Ripple Rejection ⁽²⁷⁾	$f = 120\text{ Hz}$, $V_O = 500\text{ mA}$, $V_I = 14\text{ V to }24\text{ V}$		60.0		dB	
V_{DROP}	Dropout Voltage	$I_O = 1\text{ A}$, $T_J = +25^{\circ}\text{C}$		2.0		V	
R_O	Output Resistance ⁽²⁷⁾	$f = 1\text{ kHz}$		18.0		m Ω	
I_{SC}	Short-Circuit Current	$V_I = 35\text{ V}$, $T_J = +25^{\circ}\text{C}$		250		mA	
I_{PK}	Peak Current ⁽²⁷⁾	$T_J = +25^{\circ}\text{C}$		2.2		A	

Notes:

26. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

27. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7815A)Refer to the test circuit, $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 1\text{ A}$, $V_I = 23\text{ V}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V_O	Output Voltage	$T_J = +25^{\circ}\text{C}$	14.75	15.00	15.30	V	
		$I_O = 5\text{ mA to }1\text{ A}$, $P_O \leq 15\text{ W}$, $V_I = 17.7\text{ V to }30\text{ V}$	14.40	15.00	15.60		
Regline	Line Regulation ⁽²⁸⁾	$V_I = 17.4\text{ V to }30\text{ V}$, $I_O = 500\text{ mA}$		10.0	150.0	mV	
		$V_I = 20\text{ V to }26\text{ V}$		5.0	150.0		
		$T_J = +25^{\circ}\text{C}$	$V_I = 17.5\text{ V to }30\text{ V}$		11.0		150.0
			$V_I = 20\text{ V to }26\text{ V}$		3.0		75.0
Regload	Load Regulation ⁽²⁸⁾	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{ mA to }1.5\text{ A}$		12.0	100.0	mV	
		$I_O = 5\text{ mA to }1\text{ A}$		12.0	100.0		
		$I_O = 250\text{ mA to }750\text{ mA}$		5.0	50.0		
I_Q	Quiescent Current	$T_J = +25^{\circ}\text{C}$		5.2	6.0	mA	
ΔI_Q	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA	
		$V_I = 17.5\text{ V to }30\text{ V}$, $I_O = 500\text{ mA}$			0.8		
		$V_I = 17.5\text{ V to }30\text{ V}$, $T_J = +25^{\circ}\text{C}$			0.8		
$\Delta V_O/\Delta T$	Output Voltage Drift ⁽²⁹⁾	$I_O = 5\text{ mA}$		-1.0		mV/ $^{\circ}\text{C}$	
V_N	Output Noise Voltage	$f = 10\text{ Hz to }100\text{ kHz}$, $T_A = +25^{\circ}\text{C}$		10.0		$\mu\text{V}/V_O$	
RR	Ripple Rejection ⁽²⁹⁾	$f = 120\text{ Hz}$, $V_O = 500\text{ mA}$, $V_I = 18.5\text{ V to }28.5\text{ V}$		58.0		dB	
V_{DROP}	Dropout Voltage	$I_O = 1\text{ A}$, $T_J = +25^{\circ}\text{C}$		2.0		V	
R_O	Output Resistance ⁽²⁹⁾	$f = 1\text{ kHz}$		19.0		m Ω	
I_{SC}	Short-Circuit Current	$V_I = 35\text{ V}$, $T_J = +25^{\circ}\text{C}$		250		mA	
I_{PK}	Peak Current ⁽²⁹⁾	$T_J = +25^{\circ}\text{C}$		2.2		A	

Notes:

28. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

29. These parameters, although guaranteed, are not 100% tested in production.

Typical Performance Characteristics

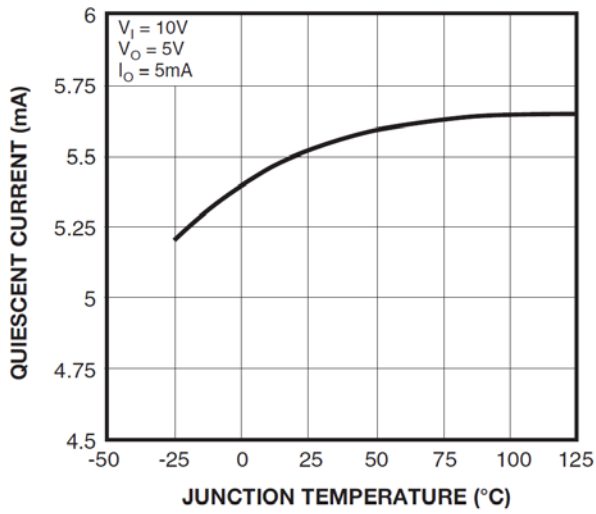


Figure 2. Quiescent Current

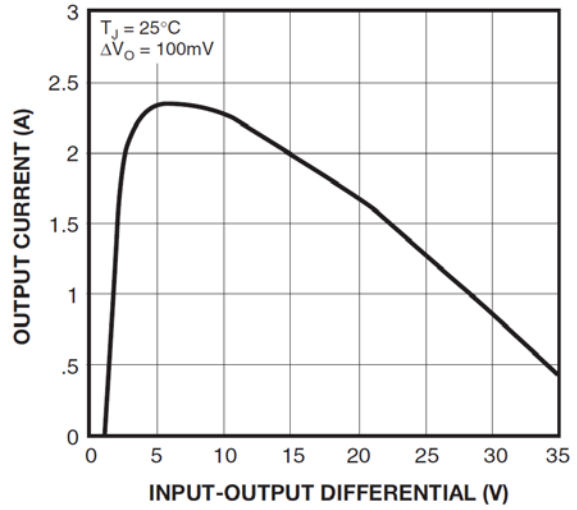


Figure 3. Peak Output Current

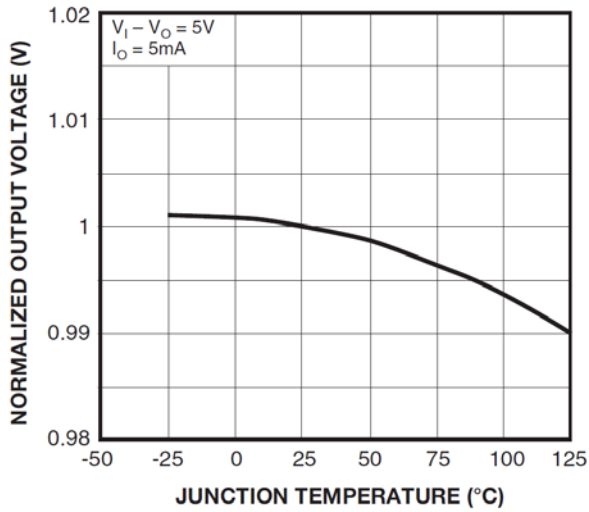


Figure 4. Output Voltage

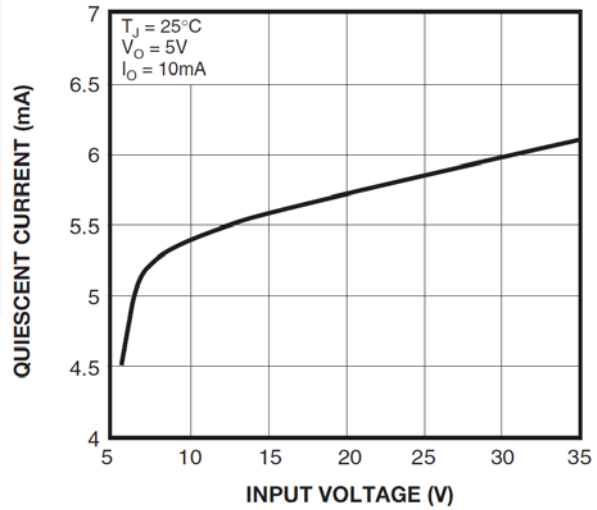


Figure 5. Quiescent Current

Typical Applications

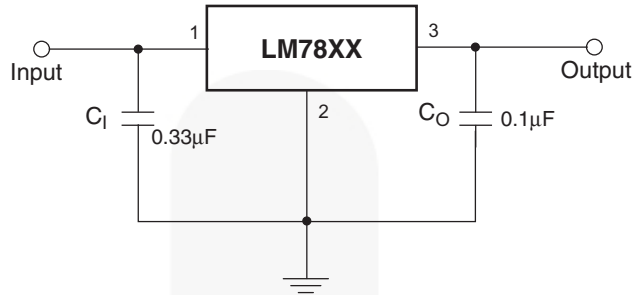


Figure 6. DC Parameters

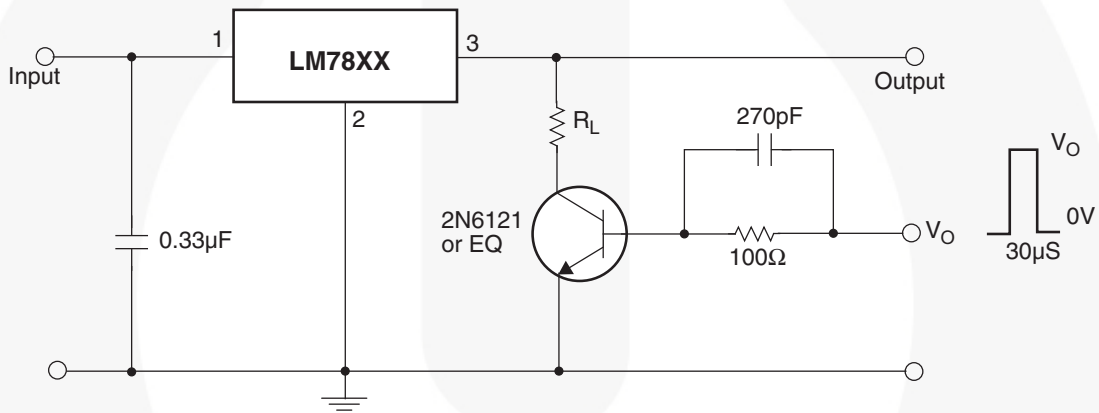


Figure 7. Load Regulation

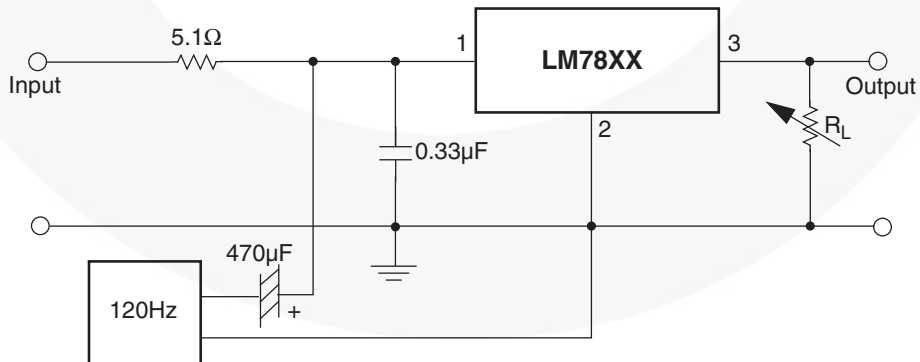


Figure 8. Ripple Rejection

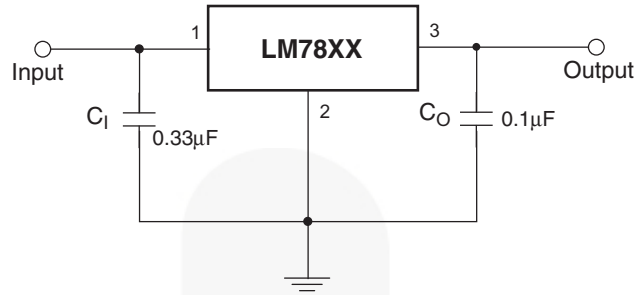
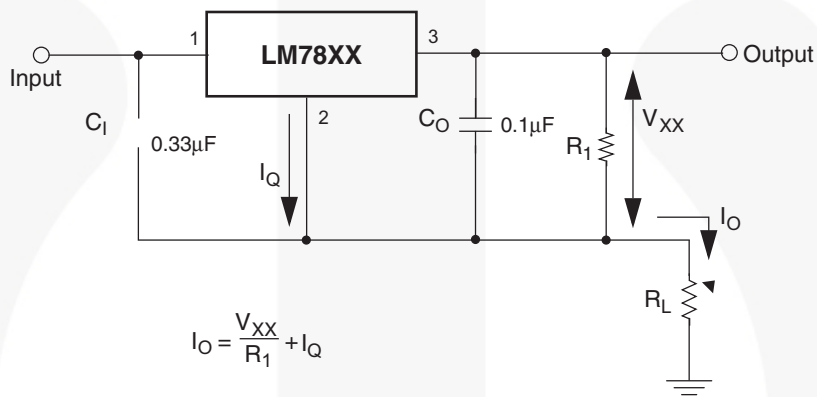


Figure 9. Fixed-Output Regulator



Notes:

29. To specify an output voltage, substitute voltage value for “XX”. A common ground is required between the input and the output voltage. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the input ripple voltage.

30. C₁ is required if regulator is located an appreciable distance from power supply filter.

31. C₀ improves stability and transient response.

Figure 10.

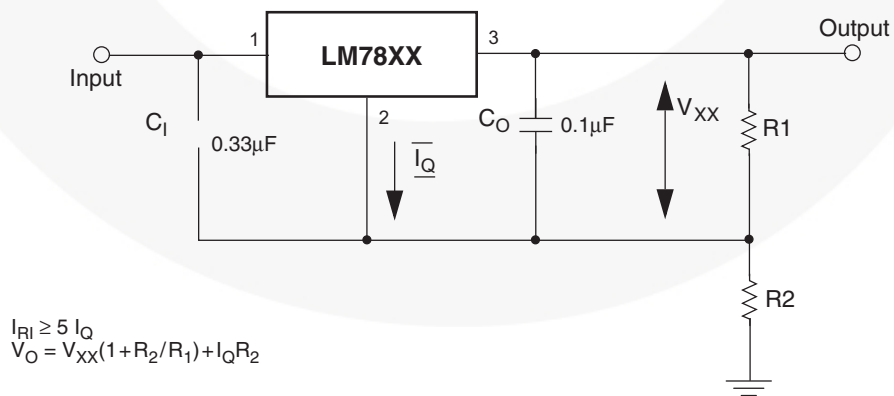


Figure 11. Circuit for Increasing Output Voltage

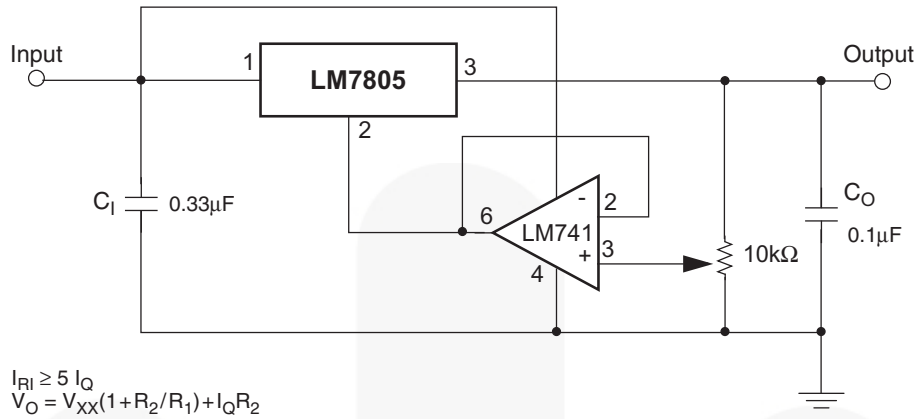


Figure 12. Adjustable Output Regulator (7 V to 30 V)

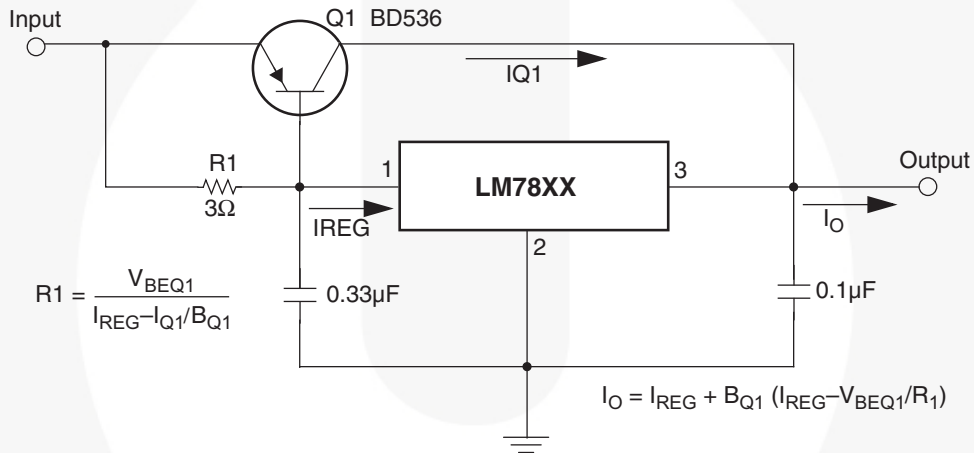


Figure 13. High-Current Voltage Regulator

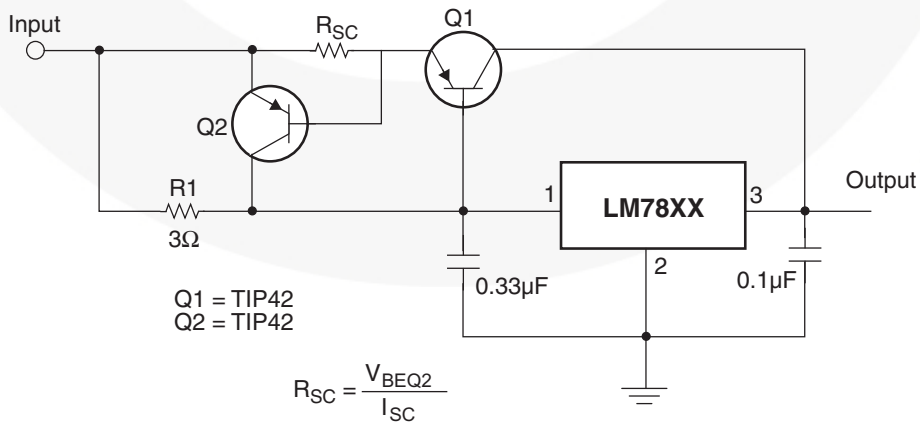


Figure 14. High Output Current with Short-Circuit Protection

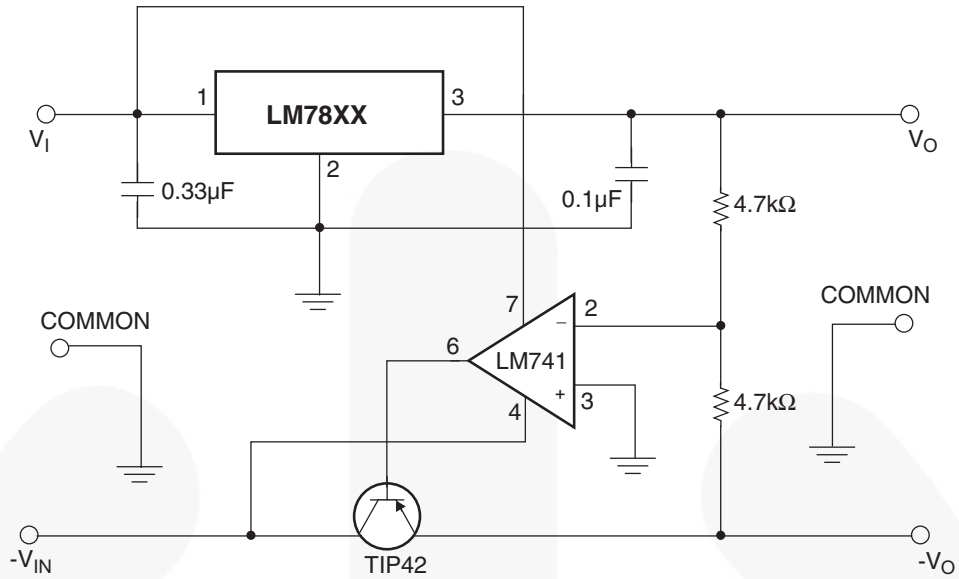


Figure 15. Tracking Voltage Regulator

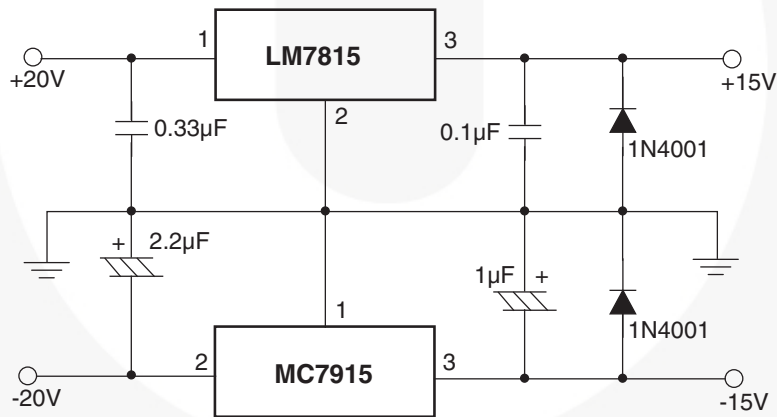


Figure 16. Split Power Supply (± 15 V - 1 A)

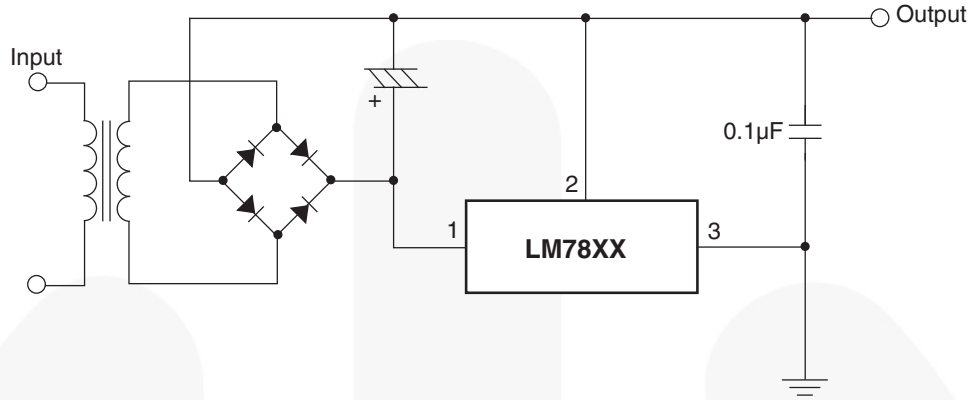


Figure 17. Negative Output Voltage Circuit

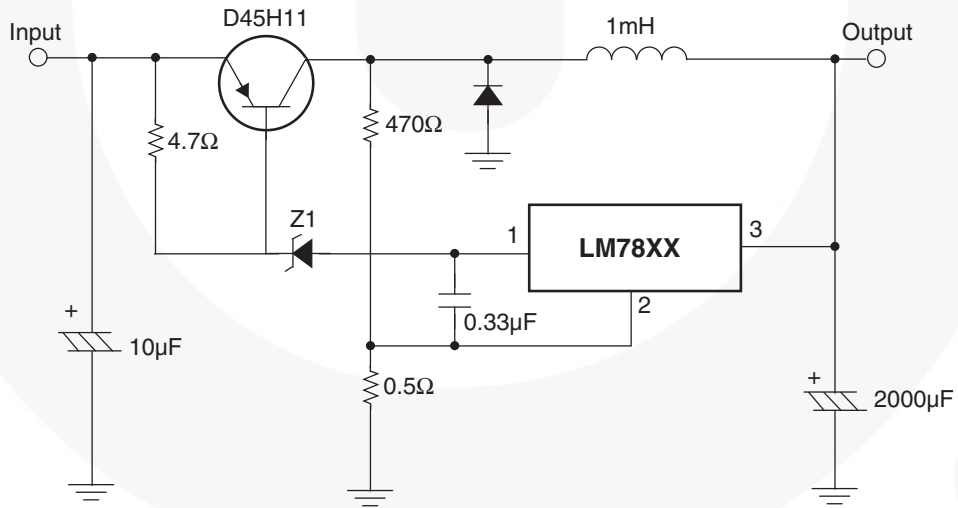


Figure 18. Switching Regulator

Physical Dimensions

TO-220 (SINGLE GAUGE)

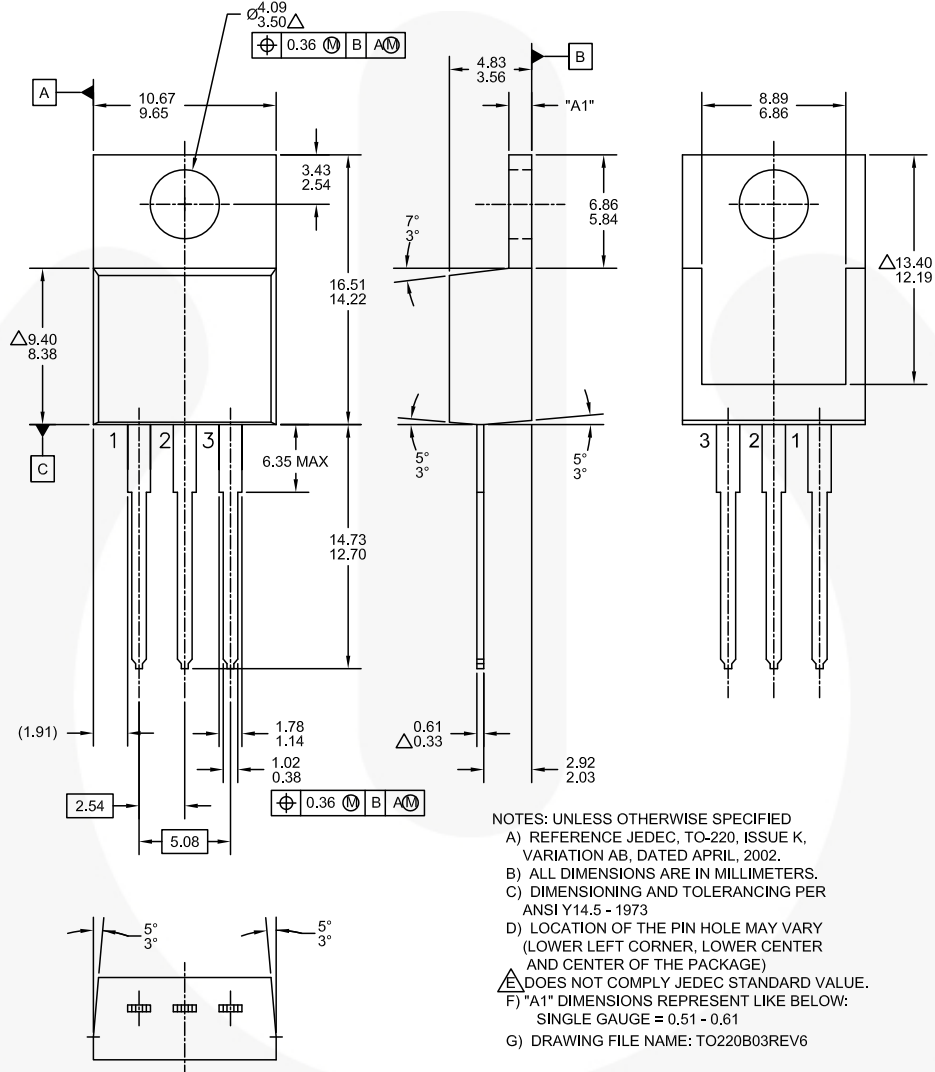


Figure 19. TO-220, MOLDED, 3-LEAD, JEDEC VARIATION AB (ACTIVE)

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:

<http://www.fairchildsemi.com/dwg/TO220B03.pdf>






For current tape and reel specifications, visit Fairchild Semiconductor's online packaging area:

http://www.fairchildsemi.com/packaging_dwg/PKG-TO220B03_TC.pdf



TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

2Cool™	FPS™		Sync-Lock™
AccuPower™	F-PFS™	PowerTrench®	
AX-CAP®*	FRFET®	PowerXS™	TinyBoost®
BitSiC™	Global Power Resource SM	Programmable Active Droop™	TinyBuck®
Build it Now™	GreenBridge™	QFET®	TinyCalc™
CorePLUS™	Green FPS™	QS™	TinyLogic®
CorePOWER™	Green FPS™ e-Series™	Quiet Series™	TINYOPTO™
CROSSVOLT™	Gmax™	RapidConfigure™	TinyPower™
CTL™	GTO™		TinyPWM™
Current Transfer Logic™	IntelliMAX™	Saving our world, 1mW/W/kW at a time™	TinyWire™
DEUXPEED®	ISOPLANAR™	SignalWise™	TranSiC™
Dual Cool™	Making Small Speakers Sound Louder and Better™	SmartMax™	TriFault Detect™
EcoSPARK®	MegaBuck™	SMART START™	TRUECURRENT®*
EfficientMax™	MICROCOUPLER™	Solutions for Your Success™	µSerDes™
ESBC™	MicroFET™	SPM®	
	MicroPak™	STEALTH™	UHC®
Fairchild®	MicroPak2™	SuperFET®	Ultra FRFET™
Fairchild Semiconductor®	MillerDrive™	SuperSOT™-3	UniFET™
FACT Quiet Series™	MotionMax™	SuperSOT™-6	VCX™
FACT®	mWSaver®	SuperSOT™-8	VisualMax™
FAST®	OptoHiT™	SupreMOS®	VoltagePlus™
FastvCore™	OPTOLOGIC®	SyncFET™	XS™
FETBench™	OPTOPLANAR®		

* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.